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ADDRESS OF THE RETIRING PRESIDENT OF THE SOCIETY, IN AWARDING THE BRUCE MEDAL TO PROFESSOR SIMON NEWCOMB.

By WILLIAM ALVORD.

At each preceding annual meeting of this Society, it has been the custom for the retiring President to deliver an address, either upon some specialty in the domain of astronomy, or upon some particular features or needs of our organization. The present meeting will of necessity mark a departure from that custom, for it is the first at which the President of this Society is allowed the privilege of making a public award of the Bruce Medal. Following the plan of the older societies similarly endowed, I shall occupy your time this evening with a brief sketch of the life and works of the distinguished American astronomer who, with the sanction (and it might almost be said, at the command) of his fellow scientists of this and many other countries, becomes the recipient of the Bruce Medal of the Astronomical Society of the Pacific "for distinguished services to astronomy."

To those of you who have followed in our *Publications* the history of this recently founded medal and the regulations adopted for its award, it will be perfectly clear that the recipient must have endeared himself, in a scientific sense, to the astronomers of the world. Not only will this also be true of each subsequent bestowal of the medal, but such a condition must especially mark this first presentation, since, according to the desires of Miss BRUCE, the medal is to be "international in character, and may be awarded to citizens of any country and to persons of either sex." It must strike us, then, with peculiar force, that of all the names of living astronomers that have been so brilliantly connected with the wonderful advances in astronomical research during the past half century, with all the manifold branches of observational work, mathematical investigation, spectroscopic and photographic study in which to seek out a worthy exponent for this distinction, one name stood forward so prominently in the communications from heads of six leading observatories of the world, that the Directors of this Society could but set the seal of their approval upon the verdict of his peers, and award the first Bruce Medal to Professor SIMON NEWCOMB.

The labors of astronomical research are beyond computation in the standards by which, for example, mercantile pursuits are judged. The preliminary study and preparation and the hardships of an apprenticeship in his chosen field would make of a man possessing the requisite mental ability of the great astronomer a most successful business man or practitioner, whose closing days would, in a vast majority of instances, be spent in the luxury of an acquired competence. There are no such pecuniary rewards for scientific devotion. There are, it is true, many noble endowments of scientific research, by means of which the early privations of a few successful students are in a measure lessened and their necessary equipment secured. The scholarships of a great university are an instance of this; would that there were more of them,—such as those established by another distinguished philanthropic woman, by means of which a certain number of advanced students are afforded a course of investigation at the Lick Observatory of our own University. But the idea of an award such as that which it is my glad privilege to make on behalf of the Astronomical Society this evening, is not intended in any sense to be a *reward*. It is, like the gold medal of the Royal Astronomical Society of England, and the Lalande and Arago medals of the French Academy, simply the expression of sincere appreciation for a grand work well accomplished—another jewel in the crown of immortality, which alone rewards the unselfish devotion of a worker in the cause of science.

It was such a design which prompted Miss CATHERINE WOLFE BRUCE, of New York (whose previous benefactions to astronomy are many and judicious), to establish the gold medal of the Astronomical Society of the Pacific. I cannot do better than to here quote one or two sentences from the original announcement made by Dr. EDWARD S. HOLDEN, who had previously been made the recipient of many aids to the Lick Observatory equipment and publications from the same benefactress, and by whom principally were drawn up the excellent regulations for the bestowal of this medal:—

" Not only will the Bruce Medal tend to the advancement of astronomy, and enable the Astronomical Society of the Pacific to adequately recognize scientific work of the highest class (and these are Miss BRUCE'S only desires), but it will forever connect the name of the founder with the progressive advances of astronomy. Those who are knowing to her very many and wise subventions of astronomical research (a few of which are spoken of in these *Publications*) will welcome this, her latest gift, for personal as well as for scientific reasons. The Society is to be congratulated that Miss BRUCE has selected it as the Trustee to carry out her generous desires. If the trust is executed, as it will be, with intelligence, fidelity, and circumspection, the time will soon come when the Bruce Medal will be one of the most highly-prized recognitions of original and useful service to Astronomical Science."

To members of scientific societies situated in the Eastern States, or even in Europe, the personality of our Medalist is well known. All the world knows of his scientific achievements. I have therefore thought that it would be gratifying to members of the Society if I gave, in this place, some brief account of the life of Professor NEWCOMB, especially because his life exhibits, in a marked way, the qualities which distinguish the great man of science, who is born, not made, and who will conquer his place no matter what the obstacles may be.

Professor NEWCOMB was born in Wallace, Nova Scotia, on March 12, 1835. His family came to New England about 1660, but removed to Nova Scotia in 1761, shortly before the breaking out of the Revolutionary War. None of his ancestors received a college training, but, after the fashion of the times, they were taught in the country schools. His grandfather was a stone-cutter by trade, and part owner of a quarry in Nova Scotia. He must have been a man of parts, for among the books in his library was a copy of Euclid's Geometry, not a common possession in the simple community in which he lived. His son, the father of NEWCOMB, became a school-teacher. There was but small opportunity for a boy in the little village in Nova Scotia where NEWCOMB'S family lived. Most of the inhabitants were very poor. The men and boys sawed lumber and cut wood for a livelihood. The women and girls sheared the sheep and wove the wool into homespun cloth. The garments for both men and women were made at home. Life was hard and books were few.

In his father's school young NEWCOMB began his studies at the age of five. At six he was already fond of arithmetic, and soon gained a local reputation for his facility in working out arithmetical problems. At the age of twelve the boy began the study of algebra, and about the same time he commenced to teach others. The Euclid which belonged to his grandfather was taken down from the bookshelves when the lad was about thirteen years old, and there he obtained his first ideas of geometrical demonstration. As he has himself said: "The book delighted me. It opened up a new world of thought, and I remember that I explained its theorems to my brother, drawing the diagrams with a pencil on the ends of the logs of a pile of wood."

From Nova Scotia young NEWCOMB went, as a country school-teacher to the eastern shore of Maryland, where he taught reading, writing, and arithmetic for a year or more.

Among Professor NEWCOMB'S papers is to be found the following certificate, which was valued then, but which reads quaintly now among the formal diplomas from the learned societies and the universities of the whole world:—

"This is to certify that Mr. SIMON NEWCOMB was well qualified to instruct children in the various branches of an English education, and possesses a good moral character. He exhibited a very considerable knowledge of the higher branches of mathematics.

W. J. SUDLER,
JOHN W. E. SUDLER,
Trustees for Primary School No. 4 of Q. A. Co., for the year ending 1855.

(Dated) Sudlersville, November 23, 1855."

At this time he sent to Professor JOSEPH HENRY, the Director of the Smithsonian Institution, an algebraical problem that was new, asking him if it were suitable for publication. The problem was submitted by Professor HENRY to a mathematician, who reported that, while the demonstration was original, it was not precisely suited for publication. HENRY, with his unfailing kindness, replied to NEWCOMB'S letter and became interested in the young man, who came to Washington at his request. I have heard that he walked from his home to the city. By HENRY'S intervention, NEWCOMB was appointed, in 1857, to be a computer on the American Ephemeris (Nautical Almanac), which was then installed at Cambridge, Massachusetts. The establishment was under the direction of Lieutenant (afterwards Admiral) CHARLES HENRY DAVIS, of the Navy, and DAVIS' relative, BENJAMIN PEIRCE, the Professor of Mathematics and Astronomy in Harvard University, was the consulting astronomer of the Ephemeris. In this new atmosphere NEWCOMB was soon at home. The little brick building on the main street of Cambridge, which was the headquarters of the Ephemeris, contained a number of men of first-rate ability, and many of the officers of the institution had already made their mark. PEIRCE was a pupil and protege of NATHANIEL BOWDITCH, and had read for him the proof-sheets of BOWDITCH'S translation of the *Mécanique Celeste* of LAPLACE as it passed through the press. NEWCOMB'S immediate colleagues were, then or soon afterwards, RUNKLE, FERREL, CHAUNCEY WRIGHT, WINLOCK, and others. KENDALL, SEARS C. WALKER, and Dr. GOULD were coadjutors also. The Harvard College Observatory was in active operation under WILLIAM BOND and his son. The intellectual tone of Cambridge, then a mere village, was extremely high. NEWCOMB found in his new surroundings precisely the atmosphere that was needed for his development. During his stay in Cambridge he attended the Lawrence Scientific School of Harvard University, from which he was graduated in 1858.

Some of his colleagues were men of high and varied culture, and all of them were accomplished in scientific matters. Books there were in plenty. The Observatory was actively engaged in original work. In native talent few, if any, of his companions approached NEWCOMB, but he had something to learn from each one of them. Perhaps his friendship with CHAUNCEY WRIGHT was as close as any. WRIGHT was not only a mathematician; he was also a philosopher, and his friendship was highly prized. GOULD had had the great advantage of a thorough training in Europe by the best astronomers of the period.

NEWCOMB'S reputation steadily grew, and in 1861 he was appointed to be Professor of Mathematics in the United States Navy, and one of the Astronomers at the Government Observatory in Washington. Previous to this (in 1857), he had been appointed on the staff of the American Ephemeris.

In 1861 he received his commission in the Navy, and in the year 1877 he was appointed to be Superintendent of the American Ephemeris, a position which he held until his retirement in 1896. His official position and his talents brought him the Presidency of the U. S. Transit of *Venus* Commission, and placed him at the head of various boards and scientific expeditions to observe the Transit of *Venus* at the Cape of Good Hope in 1882.

Professor NEWCOMB married a granddaughter of FERDINAND R. HASSLER, who was the first Chief of the United States Coast Survey. Mrs. NEWCOMB has been a veritable helpmate during all the years of his activity, sharing in his trials and in his triumphs, and sparing him all the minor ills of life so far as lay in her power. Of his three surviving children, all girls, one at least has shown decided talent, and has taken a high degree as a physician from a foreign university.

A few words may be said of the individuality of our Medalist as I have learned it from a personal acquaintance, which extends back to 1873, when I was one of the Trustees of the Lick Trust and NEWCOMB its chief adviser; and derived also from the conversation of astronomers who have known him intimately, and who honor and revere his character and attainments. It is proper to here mention that a great deal of the preceding information has been kindly gathered for me by Dr. E. S. HOLDEN, whose acquaintance with our Medalist has been lifelong and intimate.

The basis of Professor NEWCOMB'S character is intellectual and moral honesty pushed to its highest degree. He loves truth and detests shams. He has, as it were, a veritable passion for justice—whether in personal relations or in civic matters. The circumstances of his career have made him ruggedly independent in thought and in speech. The essential quality of his mind is that of a philosopher, rather than that of a mathematician or an astronomer merely. His achievements in the pure sciences have been very extended and extraordinary, but his work in political economy, though not so extensive, has fully proved that if he had devoted himself exclusively to this science, he would have attained the very highest rank. Even as it is, he ranks among the great names. In his treatment of all questions, it is the philosophical habit of his mind which is the most remarkable and the most valuable.

His most original investigation — a new method of investigation in the lunar theory — is marked by philosophic insight as well as by mathematical power and astronomical sagacity.

With all these qualities, there is a notable practicality in his methods of work which has stood him in good stead and enabled him to complete vast labors, which another man scarcely less gifted might not have been able to bring to a termination. The tendency of the practical astronomer, who is this and nothing more, is to refine on his observations until they have been brought to the last possible degree of attainable precision and even carried beyond it. In all of NEWCOMB'S work in practical astronomy, he has kept clearly in mind the object for which his observations were made; and when his observations were sufficiently accurate, and when there was an adequate number ot them, he has terminated the work and calculated the desired result with the least possible delay. In this way he has saved himself and the world much time. His results have been quickly forthcoming. The merit is great. The danger of such a procedure is, that results may be too quickly reached and accepted on authority.

In theoretical researches the same practical tendency is manifest, and corresponding results have been attained. It is due to this faculty that the enormous task of revising the elements of the orbits of the major planets and of tabulating them in convenient forms has been carried through to completion in a comparatively short time. This gigantic task would have been above even his powers, had it not been for this practicality to which I have referred.

In pure mathematics his work has chiefly been directed to investigations that were suggested by the needs of astronomy as experienced in his previous work. His mathematical thinking has usually been along lines suggested by astronomical necessities.

On a few occasions he has made successful excursions into the geometry of Hyper-Space. These "fairy tales of geometry" are very attractive to his mind, so that he chose for the subject of his Presidential Address to the American Mathematical Society (1897), "The Philosophy of Geometry of Four-Dimensions."

His many mathematical text-books are characterized by a practical tendency which gives them great value, and at the same time the philosophical bent of his mind has forced him to regard the subjects treated from a high and generalized point of view.

The list of Professor NEWCOMB'S honors is a very long one. He is a member of nearly every Academy of Science in Europe, and has received honorary degrees from many universities in this country and abroad. In 1872 he was elected one of the fifty Foreign Associates of the Royal Astronomical Society of London, and in 1874 he received the gold medal of that Society.

In 1877 he was elected a foreign member of the Royal Society of London, and the Copley Medal was awarded to him in 1890.

In 1877 he was President of the American Association for the Advancement of Science, and in the same year his portrait was ordered to be painted for the gallery of portraits of great astronomers in the Imperial Observatory of Russia.

In 1878 he received the Huyghens Medal from Holland, an award which is made only once in each twenty years, and then only for the most important work of the period.

He has been corresponding member of the Academy of Sciences of Paris since 1874, and one of its eight Foreign Associates since 1895, and an officer of the Legion of Honor of France since 1896.

In 1897 the Imperial Academy of Sciences elected him to membership, and in the same year he received the Schubert Gold Medal of the Academy — a rare honor.

In acknowledgment of his services to the Imperial Observatory of Russia in the making of its great telescope, the Czar presented him with a magnificent onyx vase, and the Japanese Government has also presented him with a pair of bronze vases. He was Vice-President of the National Academy of Sciences during the years 1883 to 1889, and President of the American Mathematical Society in 1897. He was the adviser of the Lick Trustees from the beginning, and it was upon his plans that the object-glass of the great telescope was contracted for.

For ten years he was head of the Department of Mathematics and Astronomy in the Johns Hopkins University, and editor of the *American Mathematical Journal.* This long list of honors is more than sufficient to exhibit the estimation in which Professor NEWCOMB'S magnificent labors are held. His highest praise may be succinctly expressed by saying, what is the undoubted fact, that he has done more than any other American since FRANKLIN to make American Science respected and honored throughout the entire world.

To these high honors, which have been fully deserved, the Astronomical Society of the Pacific adds its first award of its Bruce Gold Medal "for distinguished services to astronomy."

During the Franco-Prussian War NEWCOMB was at the

Observatory of Paris engaged in examining its records for data necessary in his researches on the motions of the principal planets. He entered the city just as the siege terminated, and prosecuted his work in the midst of the horrors of the Commune, passing the barricades daily in going to and from his study at the observatory.

Professor NEWCOMB is not only an astronomer and mathematician. He has made a name in political economy as well. In 1865 his book, "A Critical Examination of Our Financial Policy," was well received. His "A B C of Finance" (1877) had a very large sale and was extremely useful coming at that time. His work, "Political Economy" (1886) is a text-book in many colleges. A favorite saying of NEWCOMB's has been, "Astronomy is my profession, and political economy my recreation."

I will not attempt to here enumerate the separate works of Professor NEWCOMB. His writings upon astronomical subjects not only fill countless pages of the leading journals, both of this country and of Europe, but occupy whole volumes upon the shelves of every standard library. All who have read his "Popular Astronomy" have been impressed with the charm of the narration no less than with the simple and direct explanation of the most difficult points. The concluding chapters on the "Stellar Universe," the "Plurality of Worlds," and the "Nebular Hypothesis" are the reflections of a true philosopher.

Outside of his mathematical works and treatises on planetary and lunar theories, many of which have been published by the American Government as appendices to "Washington Astronomical and Meteorological Observations" (yearly), and as "Professional Papers of the Nautical Almanac" (periodically), Professor NEWCOMB has, in addresses delivered before learned bodies, and in contributions to the different magazines, made frequent incursions upon the literature of widely different subjects. In addition to the works upon political economy already mentioned, there may be specified his essays upon: "Abstract Science in America" (*North American Review*, January, 1876); "The Course of Nature" (*Popular Science Monthly*, October, 1878); "Formative Influence" (*Forum*, April, 1891); "Why We Need a National University" (*North American Review*, February, 1895); "Science During the Victorian Era" (*The Independent*, June 17, 1897); besides the addresses at the dedications of many important observatories, the latest and perhaps most prominent of which was the oration upon the "Aspects of American Astronomy," delivered at the opening of the Yerkes Observatory in October last.

He has developed the theories, and prepared tables of the moon and all the planets, besides investigating all the principal "Constants" of astronomy, and his results are accepted as standard places of the fundamental stars, upon the accuracy of which the reliability of the deduced planetary and lunar movements must necessarily depend. And he has even found time for an extended investigation of the theory of the asteroids.

In the opinion of Professor HOLDEN, who for many years prepared the Smithsonian Reviews of "Astronomical Progress," and is a recognized authority upon Astronomical Bibliography, the *best* thing that NEWCOMB has done is his "New Method in the Lunar Theory"; and the *biggest* thing his "Series of Planetary Tables."

Although Professor NEWCOMB has retired from the management of the "American Ephemeris," it is certain that his contributions to astronomy are by no means ended, and that as long as he is spared to mankind his pen will be industrious for the ennoblement of Science, and the demonstration of Truth. A full and complete list of his writings may well be left to more competent hands at that day (which we all hope may be far remote) when his grand work shall have been finished, and when full justice may be done to the vast output of that mighty intellect.

When future Boards of Directors of this Society shall award subsequent Bruce Medals, the recipients thereof may well look back upon this date and think that the first one was tendered to, and accepted by, the foremost American astronomer. The first name has been entered upon a glorious roll of honor that will reflect credit alike upon this Society, the wise and beneficent lady who founded the medal, and upon the achievements of those who explore the boundless depths of the Universe.

Mr. Secretary, in the absence of our Medalist, whose presence here, had it been possible, would have been an additional source of satisfaction to this Society, I beg to hand you the award for transmission to Professor NEWCOMB.

WILLIAM ALVORD.

SAN FRANCISCO, April 2, 1898.